SENSITIVE AREAS APPENDIX
TO
THE AREA CONTINGENCY PLAN
FOR
REGION III

Prepared by the Region III Inland Area Committee

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SECTION 1

PURPOSE AND OBJECTIVE

The purpose of this document is to create a "Sensitive Areas" (SA) appendix to the Area Contingency Plan (ACP). The intent of the format of the appendix is to maintain a document which addresses federal, state, and local concerns and can be useful to responders at the scene of an oil spill and/or hazardous substance incident. Wherever possible, the information contained in this document will be computerized using the Geographic Information System (GIS).

The objective of this appendix is to highlight both "environmentally" and "economically" sensitive areas. The information contained herein will identify areas according to location (longitude and latitude) and will indicate priority areas to be protected, along with preferred protection strategies, if available.

SECTION 2

AUTHORITY AND APPLICABILITY

The SA appendix to the ACP was written and compiled under congressional mandate, to support the intent of the ACP as required by Title IV, section 4202 of the Oil Pollution Act of 1990 (OPA), which amends Subsection (j) of Section 311 of the Federal Water Pollution Control Act (FWPCA) (33 U.S.C. 1321 (j)) as amended by the Clean Water Act (CWA) of 1977 (33 U.S.C. 1251et seq). This appendix was written to be used in conjunction with the National Contingency Plan (NCP) (40 CFR part 300) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA, 42 U.S.C. 9601) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The appendix only applies to the areas designated in Section III (Designated Areas) of this document. The authors of the appendix are representatives of the Inland Area Committee, as well as representatives of the States/Commonwealths of Delaware, Maryland, West Virginia, Pennsylvania, and Virginia; the District of Columbia; the U.S. Department of Transportation (U.S. Coast Guard); the U.S. Department of the Interior (Fish and Wildlife Service); the U.S. Department of Commerce (National Oceanic and Atmospheric Administration); the U.S. Environmental Protection Agency (EPA) Region III; and private organizations.

SECTION 3

DESIGNATED AREAS

This section details regional, district and zone boundaries of Federal agencies having jurisdiction and responsibilities within Federal Region III. The responsibility to provide on-scene-coordinators (OSCs) for incidents or potential incidents has been placed upon the EPA, U.S. Coast Guard (USCG), and the Department of Defense (DOD). The DOD will provide an OSC for all DOD related incidents and for all non-DOD related incidents occurring on DOD property within Federal Region III as outlined in NCP Section 300.120(b). All other real or potential incidents will be responded to by OSCs provided by either EPA or the USCG. The USCG will provide the OSC within the coastal zone. The EPA will provide OSCs within the inland zone. The Coast Guard, through the appropriate Captain of the Port, shall be responsible for furnishing the pre-designated on-scene coordinator for all discharges of oil and hazardous substances which result from a vessel casualty or vessel-transfer activity which occur in these specified ports and harbors of the inland river system. The EPA will provide the OSC for all incidents occurring elsewhere within EPA Region III. The Coast Guard will not normally respond to those discharge incidents within their pre-designated zone which occur (1) at industrial facilities, (2) from non-marine transportation casualties, (3) at bulk storage facilities, and (4) at hazardous waste sites.

Operations and resources permitting, the USCG will, at the request of EPA Region III, provide assistance and a First Federal Official on scene to those major incidents which occur in the inland zone that require immediate federal response presence to assess the impact and extent of the oil/hazardous materials release.

The following Inland/Coastal Boundary Agreements exist between the EPA and Coast Guard:

Maryland and Virginia

For pollution response purposes in Maryland and Virginia, the boundary between EPA and the USCG starts at the west bank of the Dismal Swamp Canal at the VA/NC border, north along the west bank of the Dismal Swamp Canal to VA State Hwy 13; hence west along State Hwy 13 to State Hwy 10; hence west along State Hwy 10 to State Hwy 156; hence north along State Hwy 156 over Ben Harrison Bridge to State Hwy 5; hence east on State Hwy 5 to State Hwy 132; hence east on State Hwy 132 to U.S. Interstate 64; hence west on U.S. Interstate 64 to State Hwy 30; hence north on State Hwy 30 to State Hwy 33; hence east on State Hwy 33 to State Hwy 14; hence east on State Hwy 14 to

State Hwy 17; hence south on State Hwy 17 to State Hwy 3; hence north on State Hwy 3 to State Hwy 33; hence west on State Hwy 33 to State Hwy 17; hence north on State Hwy 17 to State Hwy 360; hence east on State Hwy 360 to State Hwy 3; hence south on State Hwy 3 to State Hwy 200; hence north on State Hwy 200 to State Hwy 360; hence west on State Hwy 360 to State Hwy 202; hence north on State Hwy 202 to State Hwy 3; hence west on State Hwy 3 to State Hwy 205; hence north along State Hwy 205 to State Hwy 218; hence north along Hwy 218 to State Hwy 301; hence east along State Hwy 301 to the west bank of the Potomac River; hence north along the west bank of the Potomac River to U.S. Interstate 495 (Cabin John Bridge); hence east along U.S. Interstate 495 to the east bank of the Potomac River; hence south along the east bank of the Potomac River to the Arlington Memorial Bridge; hence east on Arlington Memorial Bridge to Independence Avenue; hence east on Independence Avenue to 15th Street SE; hence north on 15th Street SE to Bladensburg Road; hence north on Bladensburg Road to New York Avenue; hence east on New York Avenue to State Hwy 50 continuing east on Hwy 50 to U.S. Interstate 295; hence south on U.S. Interstate 295 to the Suitland Parkway; hence east along the Suitland Parkway to MD State Hwy 5; hence south along State Hwy 5 to State Hwy 231; hence east along State Hwy 231 to State Hwy 2; hence north along State Hwy 2 to State Hwy 178; hence north along State Hwy 178 to State Hwy 3; hence north along State Hwy 3 to U.S. Interstate 695; hence west along U.S. Interstate 695 around the city limits of Baltimore to U.S. Interstate 95; hence east on Interstate 95 to the west bank of the Susquehanna River; hence north along the west bank of the Susquehanna River to the Conowingo Dam; hence east along the Conowingo Dam to the east bank of the Susquehanna River; hence south along the east bank of the Susquehanna River to U.S. Interstate 95; hence east along U.S. Interstate 95 to the MD/DE border; hence south along the MD/DE border to the north bank of the Chesapeake & Delaware Canal; hence east along the north bank of the Chesapeake & Delaware Canal to Reedy Pt.; hence due south from Reedy Pt. to the south bank of the Chesapeake & Delaware canal; hence west along the south bank of the Chesapeake & Delaware canal to MD State Hwy 213; hence south along State Hwy 213 to State Hwy 50; hence south along State Hwy 50 to State Hwy 13; hence south along State Hwy 13 to the VA/MD border; hence east along the VA/MD border to State Hwy 12; hence north along State Hwy 12 to State Hwy 113; hence north along State Hwy 113 to the DE border.

All spills originating from the above named highways and inland of the line described above will have the EPA as the pre-designated on-scene coordinator (OSC). All spills originating from waterfront facilities within the city limits of Richmond, Washington, DC, Cambridge, Salisbury and Seaford will have the U.S. Coast Guard as the pre-designated OSC. All spills originating in the Nanticoke River from its mouth to Seaford, Delaware will have the U.S. Coast Guard as the pre-designated OSC. All hazardous chemical spills which originate from vessels, regardless of their location, will have the Coast Guard as the pre-designated OSC. The proposed boundary lines do not preclude mutual assistance between the two agencies.

<u>Eastern Pennsylvania and Delaware</u>

For pollution response purposes in eastern Pennsylvania and Delaware, the boundary between EPA and USCG starts at the US Highway 1 bridge between Morrisville, PA and Trenton, NJ and follows westward along US 1 to its intersection with US 13; thence southward on US 13 to the intersection with I-95 in the Croyden-Bridgewater area; thence southward along I-95 to its intersection with US 40 in Wilmington, DE; thence eastward along US 40 to its intersection with Delaware State Route 9; thence along State Route 9, southward, to its intersection with US 113; thence along US 113; southward, to the Delaware-Maryland border. The EPA will respond to spills inland of the line described above with the exception of the Schuylkill River where the USCG will respond to all spills below the dam at Fairmount Park. MSO Baltimore will provide pollution response along the C&D Canal west of the State Route 9 bridge.

Northwestern Pennsylvania

For pollution/incident response purposes in northwestern Pennsylvania, the U.S. Coast Guard will provide the OSC for all incidents occurring in the U.S. waters of Lake Erie from the Ohio-Pennsylvania state line to the Pennsylvania-New York state line. Within this area the Coast Guard will also provide the OSC for all incidents occurring in Lake Erie's harbors, ports and major tributaries to the extent they are navigable to large utility craft. The EPA will provide the OSC for all other areas in northwestern Pennsylvania.

Western Pennsylvania, Ohio and West Virginia

For pollution/incident responses in portions of the Monongahela, Allegheny, Ohio and Big Sandy River systems, the U.S. Coast Guard will provide the OSC for all incidents. The U.S. Coast Guard Second District has identified the following river reaches as specified ports and harbors for the inland river system within EPA Region III and U.S. Coast Guard Second District. The zones shall encompass the area from bank to bank or levee to levee wherever a levee is present.

River System	Mile Markers	Pre-designated OSC
Monongahela River	0.0 to 23.8	COMSO PITTSBURGH
Allegheny River	0.0 to 24.2	COMSO PITTSBURGH
Ohio River	0.0 to 31.7	COMSO PITTSBURGH
	303.0 to 317.2	COMSO HUNTINGTON
Big Sandy River	0.0 to 4.0	COMSO HUNTINGTON

SECTION 4

SENSITIVE AREAS IDENTIFIED

As described in this appendix "sensitive areas" include areas of special economic or environmental importance that might be adversely affected by a discharge. In describing areas of special economic and environmental importance, several factors should be considered. The factors include, but are not limited to: the presence and proximity of natural resources, environmentally sensitive areas, endangered species habitats, population concentrations, drainage basins and appropriate geographic and/or topographic features, water supplies, beaches, ports, recreational areas, areas of seasonal significance, and migratory bird flyways.

Environmentally Sensitive Areas refers to environments that may be considered habitat to fish and wildlife or contain significant biological resources other than fish and wildlife. Environmentally sensitive areas are broken down into three separate subareas: habitat, management areas and biological resource areas.

Habitat

- Marshes, tidal or fresh
- Swamps, tidal or fresh
- Riverine, tidal or fresh
- Intertidal flats both exposed and sheltered
- Sheltered sand/mud flats, sheltered scarps in bedrock
- Sheltered vegetated low banks
- Muddy unvegetated substrates, vegetated low banks
- Submerged aquatic vegetation
- Sheltered manmade structures, sheltered rocky shores
- Sheltered scarps in bedrock
- Mixed sand and gravel beaches
- Soft bottom subtidal areas
- Fine grained sand beaches
- Eroding scarps in unconsolidated sediments
- Exposed eroding banks in unconsolidated sediments
- Exposed rocky bank
- Exposed muddy vegetated low bank
- Exposed rocky cliff
- Gravel beach
- Lakes, large
- Rip rap structure

- Shelving bedrock shore
- Small lakes/ponds
- Solid vertical manmade structure
- Stream riffle/pool
- Vegetated steeply sloping bluff
- Wave cut platforms in bedrock
- Wetlands

Management Areas

- State/National Forests
- State/National Conservation Areas
- State/Federal/Local preserves
- Wildlife refuges
- Federal/State land designated for protection of natural ecosystems
- Proposed wildlife areas
- State/Federal sanctuaries
- State/Federal wilderness areas
- National estuary program areas
- State/Federal Management Act designated areas
- Clean lakes program critical areas
- State/Federal designated scenic or wild rivers
- State/Federal waterfowl and game management areas
- State Lands
- Private conservation areas
- National/State/Local park not water dependent
- Near coastal waters program area

Biological Resource Areas

- Spawning grounds, breeding grounds or nesting areas
- Migratory pathways and feeding areas
- Critical habitat or habitat used by Federal/State designated or proposed endangered species
- Sensitive benthic communities and aquatic vegetation
- Marine mammal haulouts, and concentration areas
- Terrestrial mammals concentration areas
- Shellfish seed beds, abundant beds, leased mussel beds, endangered freshwater mussel beds, nursery areas, concentration areas
- Reptiles/Amphibians nursery areas, concentration areas
- Animals and plants that fall into endangered species

Economically Sensitive Areas refers to environments that are susceptible to the direct impacts of oil due to the economic value of the natural resources (e.g., from both a recreational and/or commercial perspective). Economically sensitive areas are broken down into three separate subareas: water dependent commercial areas, water dependent recreational areas and anthropological areas.

Water Dependent Commercial Areas

- Drinking water intakes
- Industrial intakes
- Aquaculture
- Marinas
- Commercial fishing areas
- Shellfish
- State/Federal and private fish hatcheries
- State/Federal irrigation agricultural channels and water projects
- Specially designated residential, commercial, and industrial areas
- Cooling water intakes
- Agricultural areas
- Locks and Dams

Water Dependent Recreational Areas

- Boating
- Public recreational areas
- Sport fishing
- State/National/Local parks and beaches
- National seashore recreational areas
- National lakeshore recreational areas
- National river reach designated as recreational

Anthropological Areas

- Indian tribes
- Historic landmarks
- Archeological sites
- Heritage program sites
- Historical sites
- Land trust areas
- Human use areas

A large number of sensitive areas have been identified in EPA Region III, which includes the states of Pennsylvania, Maryland, Delaware, Virginia, West Virginia and the District of Columbia.

Information on sensitive areas was obtained from Facility Response Plans (FRPs) and other information provided to EPA by various industries and state, local and private agencies. The FRPs identify sensitive area locations primarily by latitude and longitudinal coordinates and provided data sheets describing these areas. Sensitive areas information obtained from state, local and private agencies was primarily in the form of data bases and located by nearest town and/or county. The information gathered from both the FRPs and agencies was organized into a Sensitive Areas Database.

This sensitive areas database contains the following fields for each sensitive area location:

- Type of sensitive environment (environmentally or economically)
- State and county location
- Agency contacts/additional reference
- Sensitive area subcategory
- Geographic description
- Potential impacts
- Recommended protective measures
- Collection and/or access points
- Information source
- Additional information

This information has been input in the EPA GIS system. Maps can then be generated for a specific area, such as a county. The generated map will contain the following data layers:

- Highways
- Waterways
- Hospitals
- Watersheds
- Superfund Sites
- Water Intakes
- Public Lands
- Populated Places
- Water Supply facilities
- Ground Water Intakes
- Hydrogeography
- Railroads
- NPDES Discharges

The map will contain a reference number for each of the sensitive areas. The user will be provided data sheets which include all of the database information for each reference number. The user can then first determine from the map where the sensitive areas are located and then use the data sheets to learn more about the particular sensitive areas highlighted.

When a spill/release incident occurs, response personnel will be able to use the latitude/longitude coordinates and/or county for the incident to identify/locate sensitive areas in the vicinity of the spill. The ultimate goal of the Region III Inland Area Committee is to computerize all information into a Geographic Information System (GIS) and have access to this system via portable laptop computers.

Sensitive area locations are being confirmed as part of the sub-area planning. As part of this sub-area planning, additional information such as protective measures and availability is being obtained, since most of this type of information was lacking from the information resources. Wherever possible, a geographical positioning system (GPS) is being used to confirm longitude and latitude points.

SECTION 5

QA/QC OF THE RESOURCE INFORMATION

Users of the resources provided in this appendix are expected to realize that the information itself is dynamic and subject to variations within seasons. It is extremely important that anyone considering protection and response decisions affecting these resources first contact and consult with the listed State/Commonwealth, Federal, and other resource specialists to refine this general information. Consultations with these specialists are the most effective way of obtaining incident specific information on the abundance, locations and condition(s) of the resources at risk. Contact with the recommended specialists should ensure that the best network of current information sources can be utilized to assist decision makers.

The Inland Area Committee has defined three levels or tiers of information based on quality which is included in this appendix. The quality of data is determined by its accuracy and precision against prescribed requirements or specifications, and by its usefulness in assisting the user in making a decision or answering a question with confidence. Each tier represents a different level of confidence.

The three levels of information are as follows:

- QA Level I is basic maps detailing information locations. This information may contain latitude and longitude, but is considered unconfirmed data.

- QA Level II is a data base or report which provides detailed information on a sensitive area type. This information has been confirmed, but may lack periodic updating.

- QA Level III is a data base which is periodically updated. This information is considered to be the highest form of confirmed data available.

All available data was used in the preparation of this appendix. Information sources that were used to identify sensitive areas were assigned QA levels based on the defined levels mentioned above. These assigned levels should be reviewed and modified, if necessary, by the trustees/resource specialists upon review of this information.
Data contained in the sensitive areas appendix will be confirmed (QA Level III) by visual inspection wherever possible. Members of the inland sub-area committee will primarily be

responsible for collecting this information. However, operators of facilities which may cause a discharge of oil or hazardous substances also have an obligation to verify the sensitive areas which may be impacted by such a release.

Data will be collected by the sub-area committees and the database will be updated every six months. EPA will maintain and update the database. Information regarding updates or changes to the database should be sent to the sub-area chairperson.

SECTION 6

INITIAL RANKING OF RESOURCES SENSITIVITY

The Inland Area Committee has determined a general ranking system of the various types of sensitive resources. These rankings were intended as general guidance for placing protection priorities on these resources in the absence of more specific information relating to a particular resource. Factors such as sensitivity, recovery time, and ease of cleanup were considered in assigning these rankings.

Environmentally sensitive areas are most at risk from oil spills when:

- Large numbers of individuals are concentrated in a relatively small area;
- Wildlife come ashore for birthing, resting, or molting;
- Early life stages are present in somewhat restricted areas;
- Areas important to specific life stages or migration patterns;
- Specific areas are known to be vital sources for propagation;
- Species are threatened or endangered;
- The season provides for a large gathering of a population; and
- A significant percentage of the population is likely to be exposed to contamination.

Economically sensitive areas are most at risk from oil spills when there are:

- High recreational use and shoreline access areas;
- Officially designated natural resource management areas;
- Resource extraction sites; and
- Archeological, historical, and cultural sites.

The Inland Area Committee recognizes that not all specific areas are identified in this appendix. This section is intended to provide the OSC and other responders with a general ranking scheme for protection strategies in the event a "Sensitive Area" has not been identified in this plan. The following ranking designations are used:

A = most sensitive
B = sensitive
C = least sensitive

This information has been added as a field to the database for each sensitive area identified. Ranking designations are on a seasonal basis. The individual locations have been assigned priorities by members of the Area Committee.

ENVIRONMENTALLY SENSITIVE AREAS

HABITAT	WINTER	SPRING	SUMMER	FALL
	J F M	A M J	J A S	O N D
Tidal Marsh (grasses)	A	A	A	A
Tidal Swamp (trees)	A	A	A	A
Large Riverine, tidal	A	A	A	A
Small Riverine/Stream, tidal	A	A	A	A
Non-Tidal Marsh (grasses)	A	A	A	A
Non-Tidal Swamp (trees)	A	A	A	A
Large Riverine, Non-tidal	A	A	A	A
Small Riverine/Stream, Non-tidal	A	A	A	A
Stream riffle/pool	A	A	A	A
Large lakes	A	A	A	A
Small lakes/ponds	A	A	A	A
Intertidal flats, exposed	B	A	A	A
Intertidal flats, sheltered	A	A	A	A
Sand/mud flats	A	A	A	A
Sheltered muddy vegetated low bank	B	A	A	A
Sheltered muddy unvegetated low bank	B	A	A	A
Exposed muddy vegetated low bank	B	A	A	A
Submerged aquatic vegetation (SAV)	A	A	A	A
Sheltered manmade structure, sheltered rocky shore	B	B	B	B
Solid vertical manmade structure, exposed rocky cliff	C	C	C	C
Vegetated steeply sloping bluff	B	A	A	A
Riprap structure	C	A	A	B
Mixed sand and gravel beach	B	A	A	B
Gravel beach	B	A	A	B
Fine grained sand beach	C	A	A	A
Soft bottom substrate	A	A	A	A
Exposed eroding bank in unconsolidated sediment	C	C	C	C
Wave cut platform in bedrock	C	C	C	C
Shelving bedrock shore	C	C	C	C
Sheltered scarp in bedrock	C	C	C	C
Eroding scarp in unconsolidated sediment	C	C	C	C

A = MOST SENSITIVE; B = SENSITIVE; C = LEAST SENSITIVE

* NOTE: The subcategories have been edited by this group to reflect an Inland Area perspective.

BIOLOGICAL RESOURCE AREAS	WINTER	SPRING	SUMMER	FALL
	J F M	A M J	J A S	O N D
Spawning grounds, breeding grounds or nesting areas	C	A	A	B
Migratory pathway and feeding area	C	A	B	A
Critical habitat used by Federal/State designated/proposed endangered species	A	A	A	A
Sensitive benthic communities and aquatic vegetation	C	A	A	A
Marine mammal haulout and concentration areas (NOT INLAND)	--	--	--	--
Terrestrial mammals concentration area	A	A	A	A
Shellfish seed bed, abundant bed, leased mussel bed, endangered freshwater mussel bed, nursery area, concentration area	A	A	A	A
Reptile/Amphibian nursery area, concentration area	B	A	A	B
Animals/plants that fall into endangered species	A	A	A	A

A = MOST SENSITIVE; B = SENSITIVE; C = LEAST SENSITIVE

MANAGEMENT AREAS	WINTER	SPRING	SUMMER	FALL
	J F M	A M J	J A S	O N D
National/State forest	C	A	A	B
National/State conservation area	A	A	A	A
Federal/State/Local preserve	A	A	A	A
Wildlife refuge	B	A	A	A
Federal/State land designated for protection of natural ecosystem (NOT IN REGION)	--	--	--	--
Proposed wildlife area	B	B	B	B
Federal/State sanctuary	A	A	A	A
Federal/State wilderness area	A	A	A	A
National estuary program area	A	A	B	A
Federal/State management act designated area	A	A	A	A
Near coastal waters program area (NOT INLAND)	--	--	--	--
Clean lakes program critical area	A	A	A	A
Federal/State designated scenic or wild river	C	A	A	B
Federal/State waterfowl and game management area (DUPLICATION)	--	--	--	--
State land	B	B	B	B
Private conservation area	A	A	A	A

A = MOST SENSITIVE; B = SENSITIVE; C = LEAST SENSITIVE

ECONOMICALLY SENSITIVE AREAS

WATER DEPENDENT COMMERCIAL AREAS	WINTER J F M	SPRING A M J	SUMMER J A S	FALL O N D	AREA
Drinking water intake	A	A	A	A	A
Industrial intake	B	C	A	A	B
Aquaculture	C	B	A	C	B
Marina	C	A	A	B	C
Commercial fishing area	A	A	A	A	A/B
Shellfish	A	A	A	A	A
Federal/State/Private fish hatchery	A	A	A	A	A
Federal/State irrigation agricultural channel and water project	C	C : A	A	C	B
Specially designated residential, commercial and industrial area	C	C	B	C	C
Cooling water intake	B	C	A	A	B
Agricultural area	C	C : A	A	C	B/C
Locks and dams	C	C	C	C	C
WATER DEPENDENT RECREATIONAL AREAS					
Boating	C	C : A	A	C	C
Public recreational area	C	C : A	A	C	C
Sport fishing	C	C : A	A	C	B
National/State/Local park and beach	C	C : A	A	C	A
National seashore recreational area	C	C : A	A	C	A
National lakeshore recreational area	C	C : A	A	C	A
National river reach designated as recreational	C	C : A	A	C	A
ANTHROPOLOGICAL AREAS					
Native lands	A	A	A	A	C
Historic landmark	A	A	A	A	A
Archaeological site	A	A	A	A	A
Heritage program site	C	C	A	C	C
Historical site	A	A	A	A	A
Land trust area	A	A	A	A	*
Human use area	A	A	A	A	*

A = MOST SENSITIVE; B = SENSITIVE; C = LEAST SENSITIVE
* = B - IN USE, C - NON USE

SECTION 7

PROTECTION GUIDELINES

In the event of a discharge, it is the responsibility of the OSC to best utilize all resources available. In order to assist the OSC, the Inland Area Committee has established recommended protection strategies for different "Sensitive Areas".

In choosing protection strategies, the OSC must realize that some methods may require concurrence with the Regional Response Team (RRT) or state or local governments. Typical strategies that require RRT concurrence include:

- shore removal, cleansing, and replacement;
- cutting vegetation;
- chemical oil stabilization;
- chemical protection of beaches;
- chemical cleaning of beaches;
- in-situ burning;
- nutrient enhancement;
- microbial addition; and
- sediment reworking.

Protection methods that do not require RRT concurrence include:

- no action;
- manual removal;
- passive collection (sorbents);
- debris removal;
- trenching;
- sediment removal;
- cold water flooding (deluge);
- cold water/low pressure washing;
- cold water/high pressure washing;
- warm water/moderate-to-high pressure washing;
- hot water/high pressure washing;
- slurry sand blasting; and
- vacuum.

*** information obtained from Shoreline Countermeasures Manual